**This Near Ideal "Fitness Food" Feeds Muscles in Just 10-15 minutes**

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**By Dr. Mercola**

A recent study looked at the role of protein in modulating post-exercise overnight recovery.

The researchers assessed the impact of protein ingestion immediately prior to sleep on digestion, absorption kinetics, and protein metabolism on 16 healthy young males.

The participants were asked to perform resistance exercises at 8pm in the evening.

At 9pm, all participants ate a recovery meal consisting of 20 grams of protein and 60 grams of carbs.

Then, 30 minutes before they went to bed, half of them drank a high-protein beverage. According to the authors[i](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_edn1):

*"During sleep casein protein was effectively digested and absorbed resulting in a rapid rise in circulating amino acid levels which were sustained throughout the remainder of the night.*

*Protein ingestion prior to sleep increased whole-body protein synthesis rates and improved net protein balance...*

*This is the first study to show that protein ingested immediately prior to sleep is effectively digested and absorbed, thereby stimulating muscle protein synthesis and improving whole-body protein balance during post-exercise, overnight recovery."*

**What and When You Eat After Your Workout Matters**

Your post-workout meal can influence the overall health effects exercise has on your body, so what to eat after your workout is an important consideration.

For example, previous research has shown that eating fewer carbohydrates after exercise can enhance your insulin sensitivity, compared to simply reducing calorie intake[ii](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_edn2). As I've explained on countless occasions, optimizing your insulin sensitivity is key for maintaining good health.

Generally speaking, after exercise your body is nitrogen-poor and your muscles have been broken down. Providing your body with the correct nutrients after your workout is therefore crucial to stop the catabolic process in your muscle and shift the recycling process toward repair and growth. If you fail to feed your muscle at the right time after exercise, the catabolic process will go too far and can potentially damage your muscle. Amino acids from high quality animal proteins, along with carbohydrates from vegetables (not grains) are essential for this process.

Good sources of animal protein include:

* Whey protein (minimally processed, and derived from organic, grass-fed, non-hormonally treated cows)
* Humanely raised, free-range chicken
* Organic eggs from pastured hens
* Grass-fed beef

Beneficial sources of carbohydrates include:

* Virtually any vegetable (limiting carrots and beets, which are high in sugar)
* Dark green, leafy vegetables such as spinach, kale or Swiss chard
* Low fructose fruits like lemon, limes, passion fruit, apricots, plums, cantaloupe, and raspberries. Avoid high fructose fruits like apples, watermelons and pears

It's important to combine a quality protein with a veggie-type carb in *every* meal, no matter whether it's a resistance training day, an interval cardio day, or a non-workout day. However, after strength training (as opposed to cardio training), your body tends to need more rapidly absorbed nutrients and a higher glycemic (fast released, starchy) carbohydrate. Another slight difference between interval cardio and strength training days is the timing of your meal.

* After cardio, you want to wait 45-60 minutes, and then consume a high-quality protein (whole food) and vegetable-type carbohydrate. (An example would be a spinach salad and some chicken, or high quality whey protein like Miracle Whey).
* After a resistance workout (muscle-building day), the ideal time to consume your post-workout meal is 15-30 minutes after finishing your session, in order to help repair your damaged muscles.

**Whey Protein - The IDEAL Fitness Food**

The high protein drink half of the participants received in the featured study was based on casein, a milk protein. But whey protein, which is also derived from milk, is considered the gold standard of protein by many, and is one of the best types of foods you can consume before and after exercise.

In a previous study, researchers set out to find which milk protein was the best for building up muscle protein. Three groups of older men were fed a meal-like amount of whey, casein, and casein hydrolysate proteins. Their protein ingestion was combined with an intravenous tracer, used to assess digestion and absorption kinetics, and to calculate their muscle synthesis rates.

According to the study, published in the *American Journal of Clinical Nutrition* last year[iii](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_edn3):

*"Whey protein stimulates postprandial muscle protein accretion more effectively than do casein and casein hydrolysate in older men. This effect is attributed to a combination of whey's faster digestion and absorption kinetics and higher leucine content."*

One of the reasons whey protein works so well is that it assimilates very quickly, so the protein will get to your muscles within 10-15 minutes of swallowing it, supplying them with the right food at the right time. Another study published in the journal *Medicine and Science in Sports & Exercise* showed the amino acids found in high quality whey protein also activate certain cellular mechanisms, including a mechanism called mTORC-1, which in turn promote muscle protein synthesis, boost thyroid, and also protect against declining testosterone levels after exercise[iv](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_edn4).

Whey protein earns its title as the perfect "fitness food" as it contains not only high quality protein, but also extremely high amounts of leucine, which is *particularly* important for muscle growth and repair.

**Leucine - A Powerful Muscle Builder**

Leucine is part of branched-chain amino acid that serves multiple functions in your body, one of which is signaling the mTOR (Mammalian Target of Rapamycin) mechanism, to increase protein synthesis and builds your muscle. However, according to fitness expert Ori Hofmekler, you need VERY HIGH amounts of leucine to reap the optimal effect - definitely far more than the recommended daily allowance (RDA) - because most of it gets used up as a building block rather than an anabolic agent.

The highest concentrations of leucine are found in dairy products; particularly whey protein.

Be aware that taking leucine as a free form amino acid supplement can be counterproductive and wrought with side effects. For example, intravenous administration of free form leucine has shown to cause severe hyperglycemic reactions and insulin resistance. Hence, to get the benefits without the side effects, make sure you get your leucine from food only.

The typical requirement for leucine is 1-3 grams daily. However, to optimize its anabolic pathway, you need as much as 8-16 grams of leucine daily. The following chart presents leucine content in common foods. As you will see, to obtain the minimum eight gram leucine requirement for anabolic purposes, you'd have to consume a pound and a half of chicken, for example, or about 16 eggs! Most would agree that's just not feasible. However, you only need **three ounces** of high-quality whey to reach the eight gram requirement, making it an obvious choice.

**Leucine Content in food / per 100g**

|  |  |
| --- | --- |
| Whey Protein Concentrate | 8.0g |
| Raw Cheddar Cheese | 3.6g |
| Lean Beef | 1.7g |
| Salmon | 1.6g |
| Almonds | 1.5g |
| Chicken | 1.4g |
| Chick Peas | 1.4g |
| Raw Eggs | 1.0g |
| Egg Yolk | 1.4g |
| Sheep Milk | 0.6g |
| Pork | 0.4g |
| Cow Milk | 0.3g |

**Avoid Sugar Before, During and After Exercise!**

Besides knowing which foods will help you optimize your exercise efforts, you also want to pay careful attention to what NOT to eat. To maximize the benefits of exercise, including weight loss benefits, you'll want to carefully *avoid:*

* Fruit juices
* Energy drinks
* Sports drinks
* Most energy bars
* Many "healthy" drinks like Vitamin Water

These, and virtually all other processed foods and beverages, contain high amounts of sugar, including [fructose](http://articles.mercola.com/sites/articles/archive/2010/01/02/highfructose-corn-syrup-alters-human-metabolism.aspx), which will effectively sabotage your efforts and nullify many of the benefits of exercise. Remember, 80 percent of the benefits you reap from a healthy lifestyle comes from you diet, and the remaining 20 percent from exercise. Exercise *cannot* counteract the harmful effects of a high-fructose diet.

Fructose fools your metabolism and essentially tricks your body into gaining weight by turning off your body's appetite-control system. It also rapidly leads to weight gain and abdominal obesity ("beer belly"), decreased HDL, increased LDL, elevated triglycerides, elevated blood sugar, and high blood pressure -- i.e., classic metabolic syndrome.

Additionally, consuming fructose, including that from fruit juices, within two hours of a high-intensity workout will decimate your natural [human growth hormone](http://fitness.mercola.com/sites/fitness/archive/2010/12/24/a-fountain-of-youth-in-your-muscles.aspx) (HGH) production - a MAJOR benefit of interval training.

You may be aware that one of my top recommended forms of exercise are [high-intensity interval exercises](http://fitness.mercola.com/sites/fitness/archive/2010/11/13/phil-campbell-on-peak-8-exercises.aspx), which are an integral part of my Peak Fitness program. Interval training effectively boosts your body's natural production of HGH, which is a vital hormone that is key for physical strength, health and longevity. However, as previously reported by *HGH Magazine*[v](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_edn5) and fitness expert Phil Campbell[vi](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_edn6), author of *Ready, Set, Go!*, avoiding fructose is vital for making this type of exercise work.

Consuming fructose will increase production of the hormone somatostatin, a primary purpose of which is to inhibit the production of HGH. Hence:

*"A high sugar meal after working out, or even a recovery drink (containing high sugar) after working out, will stop the benefits of exercise induced HGH. You can work out for hours, then eat a high sugar candy bar or have a high sugar energy drink, and this will shut down the synergistic benefits of HGH," HGH Magazine writes.*

Granted, there is a small group of elite and highly competitive athletes for whom increasing growth hormone is not a primary goal. For these athletes, consuming some carbs, preferably dextrose-based, in the recovery period is probably a good idea to improve their recovery time and will help to maximize their athletic performance. Since they're competing, they're less likely to be concerned about long-term growth hormone levels. But for most others, increasing HGH through high intensity interval exercise is an important factor for optimizing health, so most of my readers will want to heed to the sugar and juice restriction.

Interestingly, it is virtually impossible to simultaneously optimize for longevity and fitness and/or fertility. If you are seeking to get pregnant or compete you will need slightly higher body fat stores to be in the optimal range. If you are not concerned about fertility or athletic performance, then lower carbs and lower percentage of body fat would be a more appropriate goal.

You also want to avoid sugar and grain carbs at least 90 minutes before going to bed in order to optimize *night-time HGH production* - a factor that the featured study does not address at all, but that is well worth taking into account. Part of the equation is that insulin and HGH are adversarial hormones - carbs will trigger insulin secretion, which basically nullifies HGH release.

**References:**

* [i](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_ednref1) [Medicine and Science in Sports and Exercise February 9, 2012 [Epub ahead of print]](http://www.ncbi.nlm.nih.gov/pubmed/22330017)

* [ii](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_ednref2) [Journal of Applied Physiology, 2010 Mar;108(3):554-60,](http://www.ncbi.nlm.nih.gov/pubmed/20044472?itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum&ordinalpos=1)

* [iii](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_ednref3) [Whey protein stimulates postprandial muscle protein accretion more effectively than do casein and casein hydrolysate in older men,American Journal of Clinical Nutrition May 2011: 93(5); 997-1005,](http://www.ajcn.org/content/93/5/997.abstract?etoc)

* [iv](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_ednref4) [Timing Protein Intake Increases Energy Expenditure 24 h after Resistance Training, Medicine & Science in Sports & Exercise, May 2010: 42(5); 998-1003](http://journals.lww.com/acsm-msse/Abstract/2010/05000/Timing_Protein_Intake_Increases_Energy_Expenditure.21.aspx)

* [v](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_ednref5) [2 Habits That Stop Your Natural HGH Production, HGH Magazine](http://www.hghmagazine.com/2-habits-that-immediately-stop-your-natural-hgh-production/)

* [vi](http://fitness.mercola.com/sites/fitness/archive/2012/04/13/fructose-post-workout-meal-support.aspx" \l "_ednref6) [Limiting Refined Sugar After Workouts, Phil Campbell, Howtobefit.com,](http://www.howtobefit.com/limiting-refined-sugar.htm)

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**Sources and References**

* [Medicine and Science in Sports and Exercise February 9, 2012](http://www.ncbi.nlm.nih.gov/pubmed/22330017)